CLAIMS

What is claimed is:

1. A system for predicting roller cone drill bit failure, comprising:
a drill string having a drill bit; and
a plurality of sensors connected to collect strain data from said drill bit;
wherein said strain data is used to calculate relative changes in strain between said sensors to thereby predict bit failure.

2. The system of Claim 1, wherein said relative changes in strain between said sensors is used to determine bit condition.

3. A system for predicting drill bit failure, comprising:
a drill string having a down hole sub assembly, said sub assembly including a plurality of sensors which measure strain;
a drill bit removably attached to said sub assembly;
wherein strain data from said sensors is used to calculate the relative average strain among said sensors.

4. The system of Claim 3, wherein said relative average strain among said sensors is used to estimate the drill bit condition.

5. A system for detecting roller cone drill bit failure, comprising:
a plurality of sensors on the lower end of a drill string connected to collect data relating to a bending moment of said lower end;
wherein said data is used to calculate changes in average bending moment.

6. The system of Claim 5, wherein said changes in average bending moment are used to ascertain drill bit condition.

7. A system for detecting roller cone drill bit failure, comprising:
a plurality of sensors on the lower end of a drill string, each of said sensors connected to detect relative change in axial strain at a particular location;
wherein bit failure is indicated when said relative change in axial strain exceeds a predetermined test.

8. The system of Claim 7, wherein said sensors are positioned on a sub assembly located above said roller cone drill bit.

9. A system for detecting drill bit failure, comprising:
a plurality of sensors on the lower end of a drill string connected to collect strain data from said lower end, said lower end having a drill bit with one or more cones;
wherein said strain data is used to calculate the average load supported by each of said cones.

10. The system of Claim 9, wherein said data is used to ascertain bit condition during drilling.

11. A method for detecting drill bit failure, comprising:
monitoring at least one bending strain in a bottom hole assembly; and
dynamically assessing degradation of said bottom hole assembly in dependence on said bending strain.

12. The system of Claim 11, wherein said bending strain is measured by sensors located on a sub assembly located above the drill bit on the drill string.

13. A method for drilling, comprising:
monitoring at least one bending strain in a bottom hole assembly which includes a drill bit; and
dynamically assessing and signalling degradation of said bottom hole assembly in dependence on said bending strain.

14. The system of Claim 13, further comprising the step of halting drilling in dependence on said step of dynamically assessing.

15. A method for drilling, comprising:
monitoring differential cone loading in a roller cone drill bit; and
dynamically assessing and signalling degradation of said drill bit in dependence on changes in said differential cone loading.

16. The system of Claim 15, further comprising the step of halting drilling in dependence on said step of dynamically assessing.

17. A method of predicting drill bit failure, comprising the steps of:
taking multiple strain measurements from an instrumented sub assembly; and
deriving information regarding bit wear from relations between said respective measurements.

18. The system of Claim 17, wherein said instrumented sub assembly does not electrically communicate with said drill bit.

19. A method of predicting drill bit failure, comprising the steps of:
analyzing the relative strain induced on different parts of a bottom hole assembly during drilling;
predicting drill bit failure based on said relative strain.

20. The method of Claim 19, wherein said bottom hole assembly comprises a drill bit and an instrumented sub assembly.

21. A method of predicting drill bit failure, comprising the steps of:
collecting strain data from a plurality of gauges connected to measure strain induced on a drill bit during drilling;
computing a ratio of average strain at each said gauge relative to another said gauge;
halting drilling when said ratio exceeds a test.